

Claims

1. A nucleic acid sensor molecule comprising an enzymatic nucleic acid component and one or more sensor components, wherein, in response to an interaction of a single stranded RNA (ssRNA) having a single nucleotide polymorphism (SNP) with the nucleic acid sensor molecule in a system, the enzymatic nucleic acid component catalyzes a chemical reaction resulting in a detectable response.  
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2. A nucleic acid sensor molecule comprising an enzymatic nucleic acid component and one or more sensor components, wherein, in response to an interaction of a single stranded DNA (ssDNA) having a SNP with the nucleic acid sensor molecule in a system, the enzymatic nucleic acid component catalyzes a chemical reaction resulting in a detectable response.  
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3. A nucleic acid sensor molecule comprising an enzymatic nucleic acid component and one or more sensor components, wherein, in response to an interaction of a single stranded RNA (ssRNA) with the nucleic acid sensor molecule in a system, the enzymatic nucleic acid component catalyzes a chemical reaction resulting in cleavage of a predetermined RNA molecule associated with a disease.  
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4. A nucleic acid sensor molecule comprising an enzymatic nucleic acid component and one or more sensor components, wherein, in response to an interaction of a single stranded DNA (ssDNA) with the nucleic acid sensor molecule in a system, the enzymatic nucleic acid component catalyzes a chemical reaction resulting in cleavage of a predetermined RNA molecule associated with a disease.  
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5. A nucleic acid sensor molecule comprising an enzymatic nucleic acid component and one or more sensor components, wherein, in response to an interaction of a peptide with the nucleic acid sensor molecule in a system, the enzymatic nucleic acid component catalyzes a chemical reaction resulting in cleavage of a predetermined RNA molecule associated with a disease.  
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6. A nucleic acid sensor molecule comprising an enzymatic nucleic acid component and one or more sensor components, wherein, in response to an interaction of a protein with the nucleic acid sensor molecule in a system, the enzymatic nucleic

acid component catalyzes a chemical reaction resulting in cleavage of a predetermined RNA molecule associated with a disease.

7. A nucleic acid sensor molecule comprising an enzymatic nucleic acid component and one or more sensor components, wherein, in response to an interaction of a single stranded RNA (ssRNA) having a SNP with the nucleic acid sensor molecule in a system, the enzymatic nucleic acid component catalyzes a chemical reaction resulting in ligation of a predetermined RNA molecule to another predetermined RNA molecule.
8. A nucleic acid sensor molecule comprising an enzymatic nucleic acid component and one or more sensor components, wherein, in response to an interaction of a single stranded DNA (ssDNA) having a SNP with the nucleic acid sensor molecule in a system, the enzymatic nucleic acid component catalyzes a chemical reaction resulting in ligation of a predetermined RNA molecule to another predetermined RNA molecule.
9. A method comprising:
  - a. contacting the nucleic acid sensor molecule of claim 1 with a system comprising at least one ssRNA having a SNP under conditions suitable for the enzymatic nucleic acid component of the nucleic acid sensor molecule to catalyzes a chemical reaction resulting in a detectable response; and
  - b. assaying for the chemical reaction resulting in a detectable response.
10. A method comprising:
  - a. contacting the nucleic acid sensor molecule of claim 2 with a system comprising at least one ssDNA having a SNP under conditions suitable for the enzymatic nucleic acid component of the nucleic acid sensor molecule to catalyzes a chemical reaction resulting in a detectable response; and
  - b. assaying for the chemical reaction resulting in a detectable response.
11. A method comprising contacting the nucleic acid sensor molecule of claim 3 with a system comprising at least one ssRNA under conditions suitable for the enzymatic nucleic acid component of the nucleic acid sensor molecule to cleave the predetermined RNA molecule.

12. A method comprising contacting the nucleic acid sensor molecule of claim 4 with a system comprising at least one ssDNA under conditions suitable for the enzymatic nucleic acid component of the nucleic acid sensor molecule to cleave the predetermined RNA molecule
- 5 13. A method comprising contacting the nucleic acid sensor molecule of claim 5 with a system comprising at least one peptide under conditions suitable for the enzymatic nucleic acid component of the nucleic acid sensor molecule to cleave the predetermined RNA molecule.
- 10 14. A method comprising contacting the nucleic acid sensor molecule of claim 6 with a system comprising at least one protein, under conditions suitable for the enzymatic nucleic acid component of the nucleic acid sensor molecule to cleave the predetermined RNA molecule.
- 15 15. A method comprising contacting the nucleic acid sensor molecule of claim 7 with a system comprising at least one ssRNA having a SNP under conditions suitable for the enzymatic nucleic acid component of the nucleic acid sensor molecule to ligate a predetermined RNA molecule to another predetermined RNA molecule.
- 20 16. A method comprising contacting the nucleic acid sensor molecule of claim 8 with a system comprising at least one ssDNA having a SNP under conditions suitable for the enzymatic nucleic acid component of the nucleic acid sensor molecule to ligate a predetermined RNA molecule to another predetermined RNA molecule.
- 25 17. The nucleic acid sensor molecule of any of claim 1 or claim 2, wherein said chemical reaction is cleavage of a phosphodiester internucleotide linkage.
18. The nucleic acid sensor molecule of any of claim 1 or claim 2, wherein said chemical reaction is ligation of a predetermined nucleic acid molecule to the nucleic acid sensor molecule.
- 25 19. The nucleic acid sensor molecule of claim 1 or claim 2, wherein said chemical reaction is ligation of a predetermined nucleic acid molecule to another predetermined nucleic acid molecule.
- 30 20. The nucleic acid sensor molecule of claim 1 or claim 2, wherein said chemical reaction is isomerization.

21. The nucleic acid sensor molecule of claim 1 or claim 2, wherein said chemical reaction is phosphorylation of a peptide or protein.
22. The nucleic acid sensor molecule of claim 1 or claim 2, wherein said chemical reaction is dephosphorylation of a peptide or protein.
- 5 23. The nucleic acid sensor molecule of claim 1 or claim 2, wherein said chemical reaction is RNA polymerase activity.
24. The nucleic acid molecule of claim 1 or claim 2, wherein said detectable response is an increase or decrease in fluorescence.
25. The nucleic acid molecule of claim 1 or claim 2, wherein said detectable response is an increase or decrease in enzymatic activity.
- 10 26. The nucleic acid molecule of claim 1 or claim 2, wherein said detectable response is an increase or decrease in the production of a precipitate.
27. The nucleic acid molecule of claim 1 or claim 2, wherein said detectable response is an increase or decrease in chemoluminescence.
- 15 28. The nucleic acid molecule of claim 1 or claim 2, wherein said detectable response is an increase or decrease in radioactive emission.
29. A kit comprising the nucleic acid sensor molecule of claim 1.
30. A kit comprising the nucleic acid sensor molecule of claim 2.
31. A kit comprising the nucleic acid sensor molecule of claim 3.
- 20 32. A kit comprising the nucleic acid sensor molecule of claim 4.
33. A kit comprising the nucleic acid sensor molecule of claim 5.
34. A kit comprising the nucleic acid sensor molecule of claim 6.
35. A kit comprising the nucleic acid sensor molecule of claim 7.
36. A kit comprising the nucleic acid sensor molecule of claim 8.
- 25 37. The nucleic acid sensor molecule of claim 5, wherein said peptide is an Hepatitis C Virus (HCV) peptide.
38. The nucleic acid sensor molecule of claim 6, wherein said protein is an HCV protein.
39. The nucleic acid sensor molecule of claim 5 or claim 6, wherein said sensor component is a sequence derived from the HCV 5'-UTR.
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40. The nucleic acid sensor molecule of claim 39, wherein said sequence derived from the HCV 5'-UTR is structural domain IIIa.
41. The nucleic acid sensor molecule of claim 39, wherein said sequence derived from the HCV 5'-UTR is structural domain IIIb.
- 5 42. The nucleic acid sensor molecule of claim 39, wherein said sequence derived from the HCV 5'-UTR is structural domain IIIc.
43. The nucleic acid sensor molecule of claim 39, wherein said sequence derived from the HCV 5'-UTR is structural domain IIId.
44. The nucleic acid sensor molecule of claim 39, wherein said sequence derived from the HCV 5'-UTR is structural domain IIIe.
- 10 45. The nucleic acid sensor molecule of claim 39, wherein said sequence derived from the HCV 5'-UTR is structural domain IIIf.
46. The nucleic acid sensor molecule of claim 39, wherein said sequence derived from the HCV 5'-UTR is structural domain I.
- 15 47. The nucleic acid sensor molecule of claim 39, wherein said sequence derived from the HCV 5'-UTR is structural domain II.
48. The nucleic acid sensor molecule of claim 39, wherein said sequence derived from the HCV 5'-UTR is structural domain IV.
49. The nucleic acid sensor molecule of claim 5, wherein said peptide is a viral peptide.
- 20 50. The nucleic acid sensor molecule of claim 49, wherein said viral peptide is derived from HCV, Hepatitis B Virus (HBV), Human Immunodeficiency Virus (HIV), Human Papilloma Virus (HPV), Human T-cell Lyphotrophic Virus Type 1 (HTLV-1), Cytomegalovirus (CMV), Herpes Simplex Virus (HSV), respiratory syncytial virus (RSV), Rhinovirus, West Nile Virus (WNV), Hantavirus, Ebola virus, or Encephalovirus.
- 25 51. The nucleic acid sensor molecule of claim 6, wherein said protein is a viral protein.
52. The nucleic acid sensor molecule of claim 51, wherein said viral protein is derived from HCV, HBV, HIV, HPV, HTLV-1, CMV, HSV, RSV, Rhinovirus, WNV, Hantavirus, Ebola virus, or Encephalovirus.
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53. The nucleic acid sensor molecule of claim 37 or claim 38, wherein said predetermined RNA is associated with HCV infection.
54. The nucleic acid sensor molecule of claim 39, wherein said predetermined RNA is associated with HCV infection.